

REMARKS

By this amendment, applicants have canceled claims 1, 4, 5 and 8 without prejudice or disclaimer.

Claims 1 - 4 stand rejected under 35 USC 103(a) as allegedly being unpatentable over United States Patent No. 6,519,959 to Kim et al in view of United States Patent No. 5,952,757 to Boyd, Jr. Applicants traverse this rejection and request reconsideration thereof.

The present invention relates to an apparatus for driving a compressor and to a refrigerating air conditioner. The apparatus for driving the compressor includes a compressor, an electric motor for driving the compression mechanism part of the compressor, and an inverter device for driving the electric motor at variable speeds. The refrigerating air conditioner of the present invention includes a compressor that comprises a compression mechanism part and an electric motor for driving the compression mechanism part, and a closed vessel receiving therein the compression mechanism part and electric motor. An inverter device is included for driving the compressor at various speeds.

According to the present invention, the electric motor comprises a self-starting type electric motor having a rotor, which comprises a cage conductor and a polarized permanent magnet. As set forth in claims 2, 3, 6 and 7, switchover means are provided so as to change over operation of the electric motor either at constant speed with a commercial electric source or at variable speed with the inverter device.

The inverter device of the present invention does not necessarily need a current-phase controlling function. The electric motor operates as an induction motor owing to the action of the three-phase windings and the cage conductor until reaching a synchronous revolution from starting, and operates as a synchronous

motor owing to the action of the three-phase windings and the permanent magnet when reaching synchronous revolution. Therefore, matching of the current-phase control by the inverter device with the electric motor is unnecessary, so that the inverter device can be made simple while the compressor has reduced starting failures. Also, while the electric motor 8 is operated in synchronous revolution, no secondary current is generated in the rotor, so that the electric motor can be operated efficiently and that slip is zero. Also, capacity control of the compressor 10 can be made by using the inverter device 12 to change the number of synchronous revolutions.

That is, the electric motor of the invention operates as an induction motor owing to the action of the three-phase windings and the cage conductor until reaching a synchronous revolution from starting, and operates as a synchronous motor owing to the action of the three-phase windings and the permanent magnet when reaching the synchronous revolution, and capacity control of the compressor is effected by changing the number of synchronous revolutions by means of the inverter device.

This is not described in Kim et al and Boyd, Jr.

Kim et al describes a permanent magnet electric motor having a permanent magnet embedded rotor. Kim et al describes technology similar to the "prior art 1" described in the present application. The air conditioner of Kim et al needs to detect an inducted voltage of the motor to indirectly detect pole positions and to control a current-phase so that relationship between the detected pole positions and the pole positions generated by the stator windings becomes optimum. This leads to complexity in the control of the inverter device, making the air conditioner expensive.

The patent to Boyd, Jr. discloses an electric motor including a stator having a stator core, a start winding and first and second main windings. The motor also includes a rotor having a rotor shaft concentrically arranged axially of the stator core and a rotor core positioned concentrically with the rotor shaft. Secondary conductors are arranged axially of the rotor shaft and extend through the rotor core. A plurality of permanent magnetic are located at an outer periphery of the rotor core and are magnetized to form a number of poles equal to the number of poles formed by the second main winding. This patent discloses that such motors are typically utilized for applications such as furnace blower motors.

Since the Boyd, Jr. patent relates to a motor for driving a blower fan, not a compressor, the Boyd, Jr. patent represents non-analogous art. Moreover, at column 2, line 57 et. seq. of Boyd, Jr., this patent suggests that it is desirable and advantageous to provide a motor which does not require a supply voltage frequency controller to change the motor speed. This portion of Boyd, Jr. teaches away from using the motor of Boyd, Jr. in the air conditioner of Kim et al with an inverter.

In any event, neither Kim et al, nor Boyd, Jr. would have suggested the use of switchover means structured so as to change over operation of the electric motor either at constant speed with a commercial electric source or a variable speed with an inverter device, as presently claimed. Accordingly, the presently claimed invention is neither disclosed nor suggested by the proposed combination of Kim et al and Boyd, Jr.

Claims 5 - 8 stand rejected under 35 USC 103(a) as being unpatentable over Kim et al in view of Boyd, Jr. and further in view of United States Patent No. 6,408,645 to Tsuboe et al. Applicants traverse this rejection and request reconsideration thereof.

Much of the Tsuboe et al patent relates to a constant speed compressor driven by a commercially available electric power source. However, the description at column 9, lines 41 - 44 indicates that the embedded magnetic type synchronous motor shown in Figure 7 is driven by using an inverter power source which can change its frequency. However, the Tsuboe et al patent does not disclose switchover means structured so as to change over operation of the electric motor either at constant speed with a commercial electric source or at variable speed with the inverter device, as presently claimed. Accordingly, the presently claimed invention is patentable over the proposed combination of Kim et al, Boyd, Jr. and Tsuboe et al.

Applicants note the Examiner has cited a number of documents as being pertinent to applicants' disclosure. However, since these documents were not applied in rejecting claims formerly in the application, further discussion of these documents is deemed unnecessary.

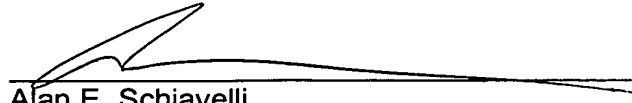
In view of the foregoing amendments and remarks, favorable reconsideration and allowance of all of the claims now in the application are requested.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli,

Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 500.43044X00),
and please credit any excess fees to such deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

A handwritten signature in black ink, appearing to read "Alan E. Schiavelli", written over a horizontal line.

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